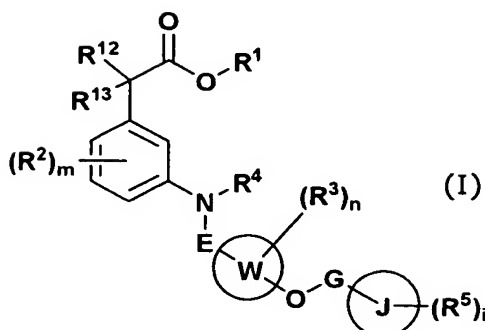


CLAIMS

1. A carboxylic acid compound represented by formula (I)



wherein R^1 represents (1) a hydrogen atom, (2) C1-4 alkyl, (3) C2-4 alkenyl, or (4) benzyl;

E represents $-\text{CO}-$, $-\text{SO}_2-$, or $-\text{CH}_2-$;

R^2 represents (1) a halogen atom, (2) C1-6 alkyl, (3) C1-6 alkoxy, (4) hydroxyl, (5) trihalomethyl, (6) cyano, (7) phenyl, (8) pyridyl, (9) nitro, (10) $-\text{NR}^6\text{R}^7$, or (11) C1-4 alkyl substituted with $-\text{OR}^8$, (12) oxidized C1-6 alkyl, (13) $-\text{SO}_2\text{R}^{11}$, (14) $-\text{SOR}^{11}$, or (15) $-\text{SR}^{11}$, or two R^2 's substituting for the adjacent carbon atom are taken together to represent (1) C2-5 alkylene which may be substituted by a substituent wherein one carbon atom thereof may be replaced with an oxygen atom, a nitrogen atom, or a sulfur atom which may be oxidized, or (2) C2-5 alkenylene which may be substituted by a substituent, wherein one carbon atom thereof may be replaced with an oxygen atom, a nitrogen atom, or a sulfur atom;

R^3 represents (1) a halogen atom, (2) C1-6 alkyl, (3) C1-6 alkoxy, (4) hydroxyl, (5) trihalomethyl, (6) cyano, (7) phenyl, (8) pyridyl, (9) nitro, (10) $-\text{NR}^6\text{R}^7$ or (11) C1-4 alkyl substituted with $-\text{OR}^8$, (12) oxidized C1-6 alkyl, (13) $-\text{SO}_2\text{R}^{11}$, (14) $-\text{SOR}^{11}$, or (15) $-\text{SR}^{11}$;

R^6 and R^7 each independently represent a hydrogen atom or C1-4 alkyl;

R^8 represents C1-4 alkyl, phenyl, or pyridyl;


R^4 represents (1) a hydrogen atom, (2) C1-6 alkyl, (3) benzyl, or (4) oxidized C1-6 alkyl;

R^5 represents (1) C1-6 alkyl, (2) C1-10 alkoxy, (3) C1-6 alkyl substituted with C1-6 alkoxy, (4) a halogen atom, (5) hydroxyl, (6) trihalomethyl, (7) nitro, (8) $-\text{NR}^9\text{R}^{10}$, (9) phenyl, (10) phenoxy, (11) oxo, (12) C2-6 acyl, (13) cyano or (14) $-\text{SO}_2\text{R}^{11}$, (15) $-\text{SOR}^{11}$, (16) $-\text{SR}^{11}$, (12) oxidized C1-6 alkyl;


R^9 and R^{10} each independently represent a hydrogen atom or C1-4 alkyl; and

R^{11} represents C1-6 alkyl or phenyl which may be substituted;

wherein R⁶'s to R¹¹'s in R²'s to R⁵'s may be the same or each independently different;

 represents a C5-12 monocyclic or bicyclic carbocyclic ring or a 5- to 12-membered monocyclic or bicyclic heterocycle;

G represents (1) C1-6 alkylene having 0 to 2 hetero atoms selected from a nitrogen atom, an oxygen atom, and a sulfur atom, (2) C2-6 alkenylene having 0 to 2 hetero atoms selected from a nitrogen atom, an oxygen atom, and a sulfur atom, or (3) C2-6 alkynylene having 0 to 2 hetero atoms selected from a nitrogen atom, an oxygen atom, and a sulfur atom;

 represents a C5-12 monocyclic or bicyclic carbocyclic ring or a 5- to 12-membered monocyclic or bicyclic heterocycle;

m represents 0 or an integer of 1 to 4,

n represents 0 or an integer of 1 to 4, and

i represents 0 or an integer of 1 to 11,

wherein R²'s may be the same or different when m is 2 or more, R³'s may be the same or different when n is 2 or more, and R⁵'s may be the same or different when i is 2 or more; and

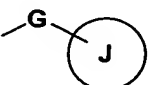
R¹² and R¹³ each independently represent (1) C1-4 alkyl which may be oxidized, (2) a halogen atom, (3) trihalomethyl, (4) hydroxyl which may be protected, (5) amino which may be protected, (6) phenyl which may be substituted, (7) pyridyl which may be substituted, or (8) a hydrogen atom, or R¹² and R¹³ are taken together to represent (1) oxo, (2) C2-5 alkylene which may be substituted by a substituent, wherein one carbon atom thereof may be replaced with an oxygen atom, a nitrogen atom, or a sulfur atom, or (3) C1-6 alkylidene which may be substituted, and

wherein when R¹² and R¹³ each simultaneously represent a hydrogen atom, the carboxylic acid compound represented by formula (I) represents a compound selected from the group consisting of the following compounds (1)-(32);


- (1) 3-((2,3-dimethyl-4-(((2S)-4-methyl-3,4-dihydro-2H-1,4-benzoxazin-2-ly)methoxy)benzoyl)amino)-4-fluorophenyl)acetic acid,
- (2) (4-chloro-3-((2,3-dimethyl-4-(((2S)-4-methyl-3,4-dihydro-2H-1,4-benzoxazin-2-ly)methoxy)benzoyl)amino)phenyl)acetic acid,
- (3) (4-chloro-3-((2,6-dimethyl-4-(((2S)-4-methyl-3,4-dihydro-2H-1,4-benzoxazin-2-ly)methoxy)benzoyl)amino)phenyl)acetic acid,
- (4) (4-chloro-3-((5-chloro-2-fluoro-4-(((2S)-4-methyl-3,4-dihydro-2H-1,4-benzoxazin-2-ly)methoxy)benzoyl)amino)phenyl)acetic acid,

- (5) (4-chloro-3-((2,5-dimethyl-4-(((2S)-4-methyl-3,4-dihydro-2H-1,4-benzoxazin-2-ly)methoxy)benzoyl)amino)phenyl)acetic acid,
- (6) (4-chloro-3-((2-fluoro-5-methyl-4-(((2S)-4-methyl-3,4-dihydro-2H-1,4-benzoxazin-2-ly)methoxy)benzoyl)amino)phenyl)acetic acid,
- (7) (4-chloro-3-((2,5-difluoro-4-(((2S)-4-methyl-3,4-dihydro-2H-1,4-benzoxazin-2-ly)methoxy)benzoyl)amino)phenyl)acetic acid,
- (8) (3-((2,3-dimethyl-4-(((2S)-4-methyl-3,4-dihydro-2H-1,4-benzoxazin-2-ly)methoxy)benzoyl)amino)-4-methylphenyl)acetic acid,
- (9) (3-((2,3-dimethyl-4-(((2S)-4-methyl-3,4-dihydro-2H-1,4-benzoxazin-2-ly)methoxy)benzoyl)amino)-5-methylphenyl)acetic acid,
- (10) (3-((2,3-dimethyl-4-(((2S)-4-methyl-3,4-dihydro-2H-1,4-benzoxazin-2-ly)methoxy)benzoyl)amino)phenyl)acetic acid,
- (11) (3-((2,6-dimethyl-4-(((2S)-4-methyl-3,4-dihydro-2H-1,4-benzoxazin-2-ly)methoxy)benzoyl)amino)phenyl)acetic acid,
- (12) (3-((2,6-dimethyl-4-(((2S)-4-methyl-3,4-dihydro-2H-1,4-benzoxazin-2-ly)methoxy)benzoyl)amino)-5-methylphenyl)acetic acid,
- (13) (5-((2,6-dimethyl-4-(((2S)-4-methyl-3,4-dihydro-2H-1,4-benzoxazin-2-ly)methoxy)benzoyl)amino)-2-fluorophenyl)acetic acid,
- (14) (5-((2,5-dimethyl-4-(((2S)-4-methyl-3,4-dihydro-2H-1,4-benzoxazin-2-ly)methoxy)benzoyl)amino)-2-methylphenyl)acetic acid,
- (15) (5-((2,5-dimethyl-4-(((2S)-4-methyl-3,4-dihydro-2H-1,4-benzoxazin-2-ly)methoxy)benzoyl)amino)-2-fluorophenyl)acetic acid,
- (16) (3-((2,5-dimethyl-4-(((2S)-4-methyl-3,4-dihydro-2H-1,4-benzoxazin-2-ly)methoxy)benzoyl)amino)phenyl)acetic acid,
- (17) (5-((2,3-dimethyl-4-(((2S)-4-methyl-3,4-dihydro-2H-1,4-benzoxazin-2-ly)methoxy)benzoyl)amino)-2-fluorophenyl)acetic acid,
- (18) (5-((2,3-dimethyl-4-(((2S)-4-methyl-3,4-dihydro-2H-1,4-benzoxazin-2-ly)methoxy)benzoyl)amino)-2-methylphenyl)acetic acid,
- (19) (5-((2,6-dimethyl-4-(((2S)-4-methyl-3,4-dihydro-2H-1,4-benzoxazin-2-ly)methoxy)benzoyl)amino)-2-methylphenyl)acetic acid,
- (20) (3-((2,6-dimethyl-4-(((2S)-4-methyl-3,4-dihydro-2H-1,4-benzoxazin-2-ly)methoxy)benzoyl)amino)-4-methylphenyl)acetic acid,
- (21) (3-((2,6-dimethyl-4-(((2S)-4-methyl-3,4-dihydro-2H-1,4-benzoxazin-2-ly)methoxy)benzoyl)amino)-4-fluorophenyl)acetic acid,
- (22) (3-((2,5-dimethyl-4-(((2S)-4-methyl-3,4-dihydro-2H-1,4-benzoxazin-2-ly)methoxy)benzoyl)amino)-4-fluorophenyl)acetic acid,

- (23) (3-((2,5-dimethyl-4-(((2S)-4-methyl-3,4-dihydro-2H-1,4-benzoxazin-2-ly)methoxy)benzoyl)amino)-4-methylphenyl)acetic acid,
- (24) (3-((2,5-dimethyl-4-(((2S)-4-methyl-3,4-dihydro-2H-1,4-benzoxazin-2-ly)methoxy)benzoyl)amino)-5-methylphenyl)acetic acid,
- (25) (4-chloro-3-((4-((2R)-2,3-dihydro-1,4-benzodioxin-2-lymethoxy)-2,6-dimethylbenzoyl)amino)phenyl)acetic acid,
- (26) (2-chloro-5-((2,3-dimethyl-4-(((2S)-4-methyl-3,4-dihydro-2H-1,4-benzoxazin-2-ly)methoxy)benzoyl)amino)phenyl)acetic acid,
- (27) (2-chloro-5-((2,6-dimethyl-4-(((2S)-4-methyl-3,4-dihydro-2H-1,4-benzoxazin-2-ly)methoxy)benzoyl)amino)phenyl)acetic acid,
- (28) (2-chloro-5-((2,5-dimethyl-4-(((2S)-4-methyl-3,4-dihydro-2H-1,4-benzoxazin-2-ly)methoxy)benzoyl)amino)phenyl)acetic acid,
- (29) (4-chloro-3-((4-((3R)-2,3-dihydro-1-benzofuran-3-lymethoxy)-2,6-dimethylbenzoyl)amino)phenyl)acetic acid,
- (30) (4-chloro-3-((2,6-dimethyl-4-(((3R)-5-methyl-2,3-dihydro-1-benzofuran-3-ly)methoxy)benzoyl)amino)phenyl)acetic acid,
- (31) (4-chloro-3-((4-((2S)-2,3-dihydro-1-benzofuran-2-lymethoxy)-2,6-dimethylbenzoyl)amino)phenyl)acetic acid, and
- (32) (3-((4-(1,3-benzodioxol-2-lymethoxy)-2,6-dimethylbenzoyl)amino)-4-chlorophenyl)acetic acid, a salt thereof, a solvate thereof, or a prodrug thereof.

2. The compound according to claim 1, wherein  is



wherein  represents C5-6 saturated carbocyclic ring, or 5- to 6-membered


saturated heterocycle containing one or two nitrogen atoms, one or two oxygen atoms, and/or a sulfur atom;

 represents C5-6 saturated carbocyclic ring, or 5- to 6-membered saturated

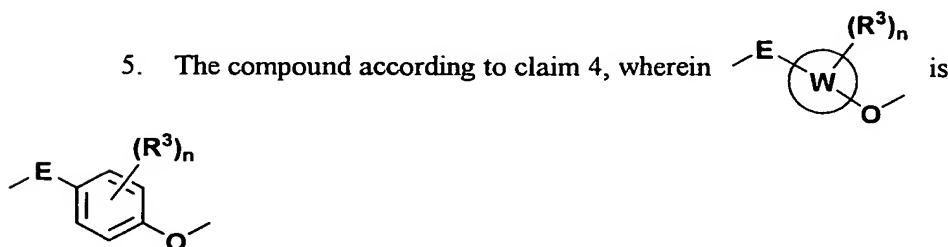
heterocycle containing one or two nitrogen atoms, one or two oxygen atoms, and/or a sulfur atom;

--- represents a single bond or a double bond; and

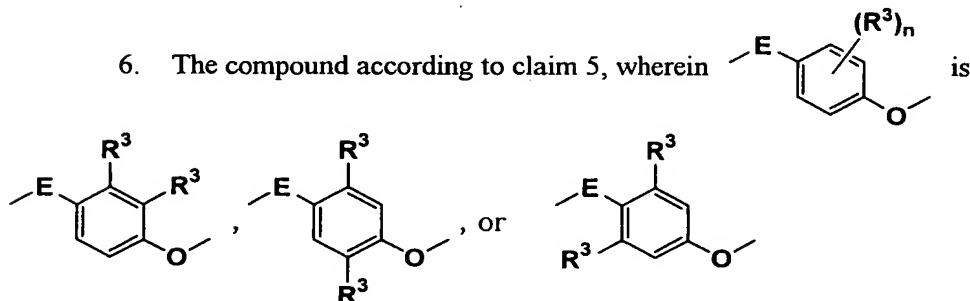
the other symbols have the same meanings as defined in claim 1, a salt thereof, a solvate thereof, or a prodrug thereof.

3. The compound according to claim 2, wherein  is a group selected from dihydrobenzooxazin-2-yl, benzodioxan-2-yl, benzoxathiane-2-yl, dihydrobenzofuran-2-yl, dihydrobenzofuran-3-yl, benzodioxol-2-yl, indolin-2-yl, and indolin-3-yl.

4. The compound according to claim 2, wherein n is an integer of 2 to 4.



wherein all symbols have the same meanings as defined in claim 1.



wherein all symbols have the same meanings as defined in claim 1.

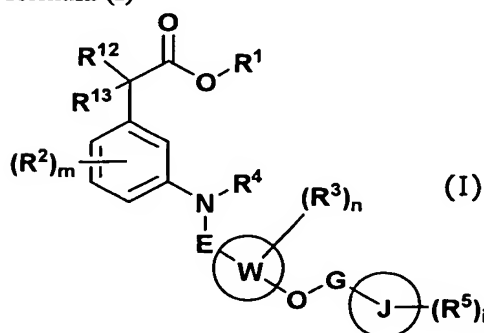
7. The compound according to claim 6, wherein R^3 's each independently represent (1) a halogen atom, (2) C1-6 alkyl, (3) C1-6 alkoxy, or (4) trihalomethyl.

8. The compound according to claim 2, wherein R^{12} and R^{13} each independently represent (1) C1-4 alkyl, (2) a halogen atom, (3) hydroxyl which may be protected, or (4) a hydrogen atom, or R^{12} and R^{13} are taken together to represent (1) oxo or (2) C2-5 alkylene which may be substituted by a substituent, wherein one carbon atom thereof may be replaced with an oxygen atom, a nitrogen atom, or a sulfur atom.

9. The compound according to claim 7, which is selected from:

- (1) 2-(4-chloro-3-((2-chloro-4-(((2S)-4-methyl-3,4-dihydro-2H-1,4-benzoxazin-2-ly)methoxy)benzoyl)amino)phenyl)-2-methylpropanoic acid,
- (2) (4-chloro-3-((2-chloro-4-(((2S)-4-methyl-3,4-dihydro-2H-1,4-benzoxazin-2-ly)methoxy)benzoyl)amino)phenyl)(difluoro)acetic acid,
- (3) (4-chloro-3-((2-chloro-4-(((2S)-4-methyl-3,4-dihydro-2H-1,4-benzoxazin-2-ly)methoxy)benzoyl)amino)phenyl)(oxo)acetic acid,
- (4) 2-(4-chloro-3-((2,5-dimethyl-4-(((2S)-4-methyl-3,4-dihydro-2H-1,4-benzoxazin-2-ly)methoxy)benzoyl)amino)phenyl)-2-methylpropanoic acid,
- (5) 2-(4-chloro-3-((2,6-dimethyl-4-(((2S)-4-methyl-3,4-dihydro-2H-1,4-benzoxazin-2-ly)methoxy)benzoyl)amino)phenyl)-2-methylpropanoic acid,
- (6) 2-(3-((2,5-dimethyl-4-(((2S)-4-methyl-3,4-dihydro-2H-1,4-benzoxazin-2-ly)methoxy)benzoyl)amino)-4-methylphenyl)-2-methylpropanoic acid,
- (7) 1-(4-chloro-3-((2,6-dimethyl-4-(((2S)-4-methyl-3,4-dihydro-2H-1,4-benzoxazin-2-ly)methoxy)benzoyl)amino)phenyl)cyclopropanecarboxylic acid,
- (8) 1-(4-chloro-3-((2,5-dimethyl-4-(((2S)-4-methyl-3,4-dihydro-2H-1,4-benzoxazin-2-ly)methoxy)benzoyl)amino)phenyl)cyclopropanecarboxylic acid,
- (9) 1-(4-chloro-3-((2-ethyl-4-(((2S)-4-methyl-3,4-dihydro-2H-1,4-benzoxazin-2-ly)methoxy)benzoyl)amino)phenyl)cyclopropanecarboxylic acid,
- (10) (4-chloro-3-((2,6-dimethyl-4-(((2S)-4-methyl-3,4-dihydro-2H-1,4-benzoxazin-2-ly)methoxy)benzoyl)amino)phenyl)acetic acid, and
- (11) (3-((2,6-dimethyl-4-(((2S)-4-methyl-3,4-dihydro-2H-1,4-benzoxazin-2-ly)methoxy)benzoyl)amino)-5-methylphenyl)acetic acid.

10. A pharmaceutical composition comprising a compound represented by formula (I)



wherein all symbols have the same meanings as defined in claim 1, a salt thereof, a solvate thereof, or a prodrug thereof.

11. The pharmaceutical composition according to claim 10, which is an antagonist of DP receptor.

12. The pharmaceutical composition according to claim 10, which is an agent for prevention and/or treatment of diseases mediated by DP receptor.

13. The pharmaceutical composition according to claim 12, wherein the disease mediated by DP receptor is allergic disease, systemic mastocytosis, disorders accompanied by systemic mast cell activation, anaphylaxis shock, bronchoconstriction, urticaria, eczema, acne, allergic bronchial pulmonary aspergillosis, sinusitis, migraine, nasal polypus, anaphylactic vasculitis, eosinophilic syndrome, contact dermatitis, diseases accompanied by itch, diseases generated secondarily as a result of behavior accompanied by itch, inflammation, chronic obstructive pulmonary diseases, ischemic reperfusion injury, cerebrovascular accident, autoimmune disease, traumatic brain disorder, hepatopathy, graft rejection, chronic rheumatoid arthritis, pleurisy, osteoarthritis, Crohn's disease, ulcerative colitis, irritable bowel syndrome, interstitial cystitis, muscular dystrophy, polymyositis, multiple sclerosis, sleeping disorders or disease related to platelet aggregation.

14. The pharmaceutical composition according to claim 13, wherein the allergic disease is allergic rhinitis, allergic conjunctivitis, atopic dermatitis, bronchial asthma or food allergy.

15. A pharmaceutical composition comprising a combination of the compound represented by formula (I) according to claim 1, a salt thereof, a solvate thereof, or a prodrug thereof; and one or more kinds selected from antihistaminic agent, suppressor for mediator liberation, thromboxane synthetase inhibitor, antagonist for thromboxane A₂ receptor, antagonist for leukotriene receptor, steroid agent, alpha-adrenergic receptor stimulator, xanthine derivative, anticholinergic agent, and nitric oxide synthase inhibitor.

16. Use of the compound represented by formula (I) according to claim 1, a salt thereof, a solvate thereof, or a prodrug thereof for the production of a pharmaceutical composition for prevention and/or treatment of diseases mediated by DP receptor.

17. Use of the compound represented by formula (I) according to claim 1, a salt thereof, a solvate thereof, or a prodrug thereof for the production of an antagonist of DP receptor.

18. A method for prevention and/or treatment of diseases mediated by DP receptor, which comprises administering to a mammal an effective amount of the compound represented by formula (I) according to claim 1, a salt thereof, a solvate thereof, or a prodrug thereof.